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ROSA ODORATA AS A GRAFTING STOCK
FOR INDOOR ROSES

By F. F. WEINARD and H. B. DORNER



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ROSA ODORATA AS A GRAFTING STOCK FOR INDOOR ROSES

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Florists recently have shown increasing interest in possible substitutes for *Rosa manetti*, used for many years as the principal grafting stock for greenhouse roses. *Rosa odorata* in particular has frequently been mentioned and has been used to some extent for this purpose. There has been conflicting evidence as to the value of *R. odorata*, however, and for this reason comparative tests with the two stocks were arranged at this Station. The results of a three-year test with the Columbia variety and a one-year test with ten other varieties of forcing roses are given in this bulletin.

Rosa manetti was raised from seed by Signor Manetti of the Botanic Gardens, Milan, and imported from Italy into England by Thomas Rivers about 1835.¹ *Rosa manetti* stocks used in the United States up to the present time have been imported almost entirely from England and France.

In spite of its undoubted utility, *Rosa manetti* has not proved entirely suitable as a stock for all varieties of forcing roses. Souvenir de Claudius Pernet on *R. manetti*, for example, may show a tendency to part at the grafts and to go dormant.⁸ This general incompatibility of *R. manetti* with the yellow roses results in low yields of inferior quality when such unions are attempted. The search for possible substitutes for *R. manetti* which may be more adaptable to forcing roses has been further stimulated by the possibility that the foreign supply of *R. manetti* may be cut off some time in the future by an extension of Quarantine Number 37.²

The variety most promising at present as a possible successor to *Rosa manetti* as a forcing stock for indoor roses is *Rosa odorata*. This rose was collected in China by Mr. Frank N. Meyer, agricultural explorer of the Department of Agriculture.⁵ It was received at the Plant Introduction Garden, Chico, California, March 16, 1908, at which time it was given the number S. P. I. 22449. Mr. Meyer wrote of the rose as follows: "Said to be a beautiful, yellow rambler rose, flowering with an abundance of flowers. Obtained from the garden of the American Presbyterian Mission in Pautingfu, who procured it from a Chinese nurseryman."

According to Mr. Peter Bisset,⁵ plant introducer, U. S. Department of Agriculture, "The rose, on flowering did not produce yellow flowers and hence the description sent did not correspond, and after growing the rose for a few years and finding out that it really made a valuable rose stock, it was decided to give it a new Seed and Plant Introduction number and a new description. This was done and S. P. I. number 44426 was assigned."

Government propagators found that ordinary cuttings of young wood of *Rosa odorata* rooted and grew readily,⁴ those put on an ordinary propagating bench giving a strike of 90 to 96 percent. Further, it was found that young canes 5 to 8 feet long could be budded and then made into cuttings after the buds had united, or canes could be cut into lengths and used as stocks for grafting. When such grafts were placed in a "sweat" box at 75° to 80° F., the cuttings rooted and the grafts grew simultaneously. As many as 90 percent of the cuttings thus made developed.

Wood from this stock was disseminated by the U. S. Department of Agriculture to growers in various parts of the country. In one of the first reports, from California,¹² the rose was declared to be an acquisition of great promise, hardy, vigorous, and above all easy to root. Grafts made on cuttings in January will make salable plants in one season in the field.¹⁴

In the discussion which arose subsequently among growers as to the identity of the new stock, no definite conclusion was reached. The suggestion of several growers^{5, 8, 9, 11, 15} seems fair, however, that the strain of *Rosa odorata* more recently introduced into the United States may possess botanical and cultural characteristics differentiating it from other similar forms.¹⁰

A fault ascribed to *Rosa odorata*, or to forms with which it is said to be similar, is that of suckering badly in the field. Varieties with the suckering habit do not make suitable stocks for garden roses. Such varieties not only cause increased labor for the nurseryman but, what is more important, the entire displacement of scion by the stock is likely to result.

Several prominent growers, however, have observed *Rosa odorata* (S. P. I. 22449) in the field and particularly in the greenhouse, and have detected no tendency toward suckering or other objectionable growth habits. On the contrary, according to Mr. E. G. Hill,^{6, 7, 9, 13, 15} the stock has given promise of being very adaptable for use with forcing roses, especially the yellow varieties. As a matter of fact, under experimental conditions at this Station this promise has been fulfilled. The vegetative growth and flowering of the several varieties grown on *Rosa odorata* has been uniformly good.

DESCRIPTION OF THE EXPERIMENT

A uniform lot of grafted Columbia plants was obtained in 1922 from the E. G. Hill Company, Richmond, Indiana. Approximately half the plants were grafted on *Rosa manetti* and the remainder on *Rosa odorata*. The *R. odorata* strain used was that disseminated by the Bureau of Plant Industry.⁷

The soil in which the plants were grown was brown silt loam well supplied with manure in the field. Dried blood and acid phosphate (applied at the rate of 5 and 15 pounds respectively for each 100 square feet of bench) were stirred into the soil before the plants were placed.

The plants on *Rosa manetti* and on *Rosa odorata* were set in alternate rows on the south bench of an east-and-west house in order that uniform conditions for growth would be insured. Temperatures maintained during the growing season were 58° F. at night and 68° during the day, rising on bright days as high as 78°. Each season in the latter part of June the soil was allowed to dry until growth ceased, altho the leaves were retained. Late in July the plants were pruned back, watered, and allowed to resume growth. At this time about an inch of the topsoil was removed and replaced with new soil, together with dried blood and phosphate applied in the same proportions as at the beginning of the first season.

The Columbia plants were left undisturbed for two years. In the third season, in order to test the effects of altered soil and temperature conditions, about half these plants were reset in new soil at the west end of the house and the remainder left at the east end of the house. The temperature in cold weather averaged several degrees higher at the west end next to the cross house than in the east end.

In 1923-24 the experiment was extended to include ten other varieties. For these tests the plants were set on four benches at the west end of the house. Small blocks of each variety on *R. manetti* and *R. odorata* respectively were planted on adjacent sections of bench. Cultural conditions were similar to those maintained in the tests with Columbia.

Since the two stocks could be compared more accurately if the flowers were allowed to develop naturally, no pinching of the buds was permitted after the middle of August. Records were kept of the productiveness of individual plants, since knowledge of the individual variations in production would permit a more accurate determination of the value of the results with any given number of plants. The methods used in determining the "probable error" are described by Babcock and Clausen.³ The period of record during which production data were taken extended from September 26 to May 10 inclusive.

DISCUSSION OF RESULTS

During the first season the yield from Columbia was 3.8 flowers per plant higher with *Rosa odorata* than with *Rosa manetti* (Table 1). In the second season the yield with *R. manetti* was the higher by 3.0 flowers per plant. In the third season there were no differences in the yields.

For the three-year period the total yield from Columbia on *R. odorata* stocks was equal to the yield on *R. manetti*. No differences of practical importance were noted in regard to stem lengths, regardless of whether average stem lengths or flower grades were used as the basis for comparison (Tables 1 and 2).

TABLE 1.—FLOWER PRODUCTION OF COLUMBIA ROSES ON *R. manetti* AND *R. odorata* STOCKS

Season	Manetti			Odorata		
	Number of plants	Flowers per plant	Average stem length	Number of plants	Flowers per plant	Average stem length
			<i>inches</i>			<i>inches</i>
1922-23 (Sept. 18-Apr. 30) ..	79	14.86 ± .31	14.56 ± .08	83	18.61 ± .32	15.10 ± .08
1923-24 (Sept. 26-May 10) ..	79	20.09 ± .41	15.73 ± .10	83	17.11 ± .36	15.48 ± .08
1924-25 (Sept. 24-May 9) ...	50	22.96 ± .74	15.52 ± .08	50	22.16 ± .65	15.45 ± .09
Averages for 3 years	..	19.30	15.27	..	19.29	15.34

In forcing roses free flower production during the winter months is particularly important. The proportionate yields for each month in the season were therefore observed (Table 3). The percentages

TABLE 2.—FLOWERS FROM COLUMBIA ROSES ON *R. manetti* AND *R. odorata* STOCKS GRADED ACCORDING TO STEM LENGTHS

Season	Stock	Percentages in each grade				
		Under 6 inches	6 to 12 inches	12 to 18 inches	18 to 24 inches	24 inches and over
1922-23.	<i>manetti</i> .....	.1	20.9	57.2	19.2	2.6
	<i>odorata</i> .....	...	18.0	58.8	17.8	5.4
1923-24.	<i>manetti</i> .....	.1	10.5	61.4	23.8	4.2
	<i>odorata</i> .....	.1	14.3	59.4	21.2	5.0
1924-25.	<i>manetti</i>	0.	12.0	60.2	24.2	3.6
	<i>odorata</i>	0.	14.4	59.1	20.9	5.6
Averages for 3 years.	<i>manetti</i>	0.	14.5	59.6	22.4	3.5
	<i>odorata</i>	0.	15.6	59.1	20.0	5.3

TABLE 3.—RELATIVE RATES OF FLOWER PRODUCTION OF COLUMBIA ROSES ON *R. manetti* AND *R. odorata* STOCKS BY MONTHS, 1922-1925

Season	Stock	Percentages of total yields								
		Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
1922-23.....	<i>manetti</i>	5.8	21.8	8.6	14.9	6.2	11.0	15.1	16.6	....
	<i>odorata</i>	3.8	24.9	6.9	16.8	7.3	10.7	13.5	16.1	....
1923-24.....	<i>manetti</i>	4.6	13.7	21.8	9.3	7.8	11.4	9.1	19.5	2.8
	<i>odorata</i>	3.7	12.2	25.8	9.2	10.8	10.6	9.0	16.0	2.7
1924-25.....	<i>manetti</i>	6.2	10.6	17.3	10.4	8.8	11.1	14.1	14.5	7.0
	<i>odorata</i>	5.6	11.3	14.7	10.4	11.5	10.6	14.8	14.8	6.3

shown for September and May were low because the period of record did not extend entirely thru these months. About 30 percent of the total yield on *R. manetti* was produced from December to February inclusive, while on *R. odorata* the proportion produced during the winter months was slightly higher. From the graphs of weekly flower

TABLE 4.—FLOWER PRODUCTION OF COLUMBIA ROSES ON *R. manetti* AND *R. odorata* STOCKS IN NEW AND OLD SOIL, 1923-24

Kind of soil	Stock	Flowers per plant	Average stem length
New.....	<i>manetti</i>	26.67 ± 1.18	<i>inches</i> 16.03 ± .10
	<i>odorata</i>	25.29 ± .98	15.80 ± .12
Old.....	<i>manetti</i>	19.54 ± .56	14.89 ± .12
	<i>odorata</i>	19.27 ± .66	15.04 ± .13

TABLE 5.—FLOWER PRODUCTION OF DIFFERENT VARIETIES OF ROSES ON *R. manetti* AND *R. odorata* STOCKS, 1923-24

Variety	Manetti			Odorata		
	Number of plants	Flowers per plant	Average stem length	Number of plants	Flowers per plant	Average stem length
Angelus.....	12	17.42 ± .61	<i>inches</i> 14.33 ± .18	12	12.58 ± 1.21	13.87 ± .17
Butterfly.....	20	15.55 ± .67	14.61 ± .14	20	18.80 ± .81	15.50 ± .12
Golden Ophelia....	11	21.91 ± 1.19	13.53 ± .20	19	24.77 ± 1.38	14.07 ± .14
Hadley.....	4	12.75 ± 1.50	16.55 ± .46	4	17.25 ± 1.39	15.98 ± .27
Milady.....	7	25.57 ± 2.02	10.92 ± .18	10	30.10 ± 1.75	12.37 ± .13
Pilgrim.....	4	15.50 ± 1.72	15.76 ± .32	21	23.52 ± 1.19	17.04 ± .15
Premier.....	13	16.38 ± 1.00	11.32 ± .17	31	18.45 ± .60	12.04 ± .03
Red Columbia.....	12	21.00 ± 2.23	13.75 ± .16	12	21.83 ± 1.16	14.69 ± .16
Rosemarie.....	8	18.50 ± .53	13.59 ± .19	8	21.38 ± 1.71	14.56 ± .17
White Ophelia.....	11	21.36 ± 1.02	13.47 ± .14	12	17.00 ± 1.05	14.65 ± .22

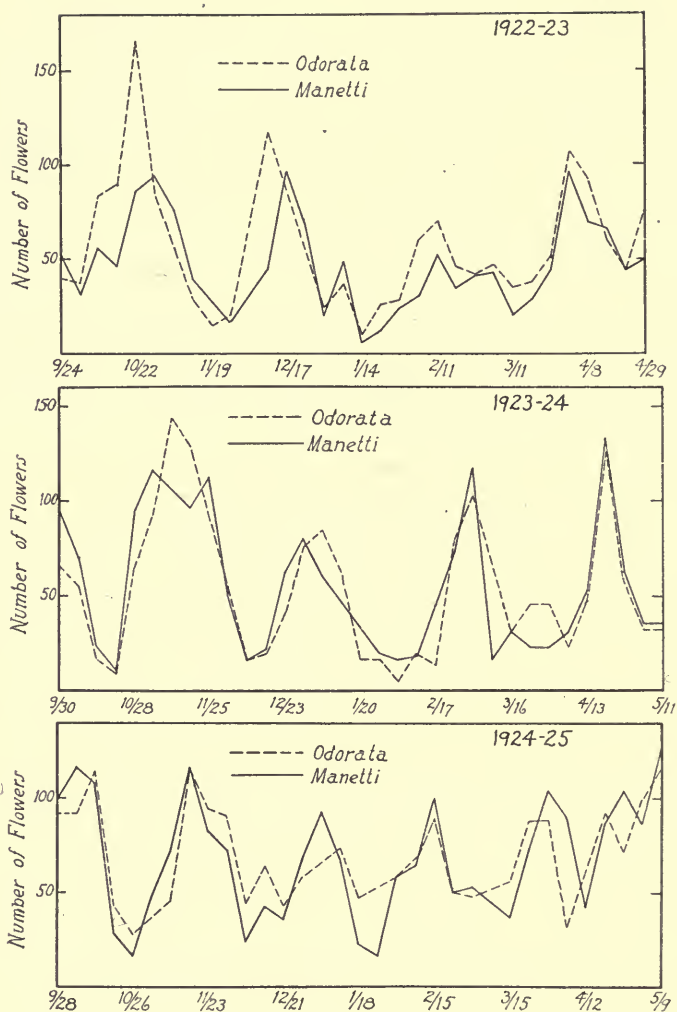


FIG. 1.—FLOWER PRODUCTION BY COLUMBIA ROSES ON *R. odorata* AND *R. manetti* STOCKS, 1922-23, 1923-24, 1924-25

The rate of flower production in the first season was uniformly higher with plants on *R. odorata* stocks. Yields in the second season were higher with plants on *R. manetti*. The results for the third season showed no differences in yields. The three-year total yields on the two stocks were very similar, showing that *R. odorata* may be used as successfully as *R. manetti* as a grafting stock for forcing roses.

production (Fig. 1) it may be seen that the flowering rates were in general similar for plants on the two kinds of stocks.

Soil and temperature conditions did not affect the relative productiveness of the two groups of plants (Table 4). It is of interest to note, however, that flower production by plants on new soil was markedly higher (about 25 percent) than the average for plants on old soil. This difference may not have been caused by quality of soil alone, inasmuch as the new soil plot was located at the warm end of the house, and with Columbia especially temperature may have been a factor of importance.

TABLE 6.—RELATIVE RATES OF FLOWER PRODUCTION OF DIFFERENT VARIETIES OF ROSES ON *R. manetti* AND *R. odorata* STOCKS, BY MONTHS, 1923-24

Variety	Stock	Percentages of total yields									
		Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	
Angelus.....	<i>manetti</i>.....	.5	31.7	3.8	15.4	5.8	7.2	14.4	8.7	12.5
	<i>odorata</i>	0.	30.6	9.5	12.1	12.1	3.5	12.7	11.4	8.1	
Butterfly.....	<i>manetti</i>	0.	33.6	2.3	11.6	4.5	12.9	10.6	14.5	10.0	
	<i>odorata</i>.....	.5	32.2	2.6	13.6	4.5	10.6	12.8	14.4	8.8
Golden Ophelia.....	<i>manetti</i>.....	.4	30.5	16.0	7.4	6.7	5.9	9.3	17.1	6.7
	<i>odorata</i>.....	.8	19.6	16.6	8.3	7.5	8.5	9.4	18.8	10.5
Hadley.....	<i>manetti</i>	0.	25.5	7.8	9.8	7.9	5.9	9.8	29.4	3.9	
	<i>odorata</i>	1.5	27.9	7.4	17.7	5.9	8.8	5.9	17.6	7.3	
Milady.....	<i>manetti</i>.....	.6	18.4	6.7	14.5	9.0	14.0	9.5	17.3	10.0
	<i>odorata</i>	0.	17.0	4.7	17.0	5.7	16.3	9.0	22.6	7.7	
Pilgrim.....	<i>manetti</i>	3.2	27.4	3.3	12.8	6.5	4.9	16.1	16.1	9.7	
	<i>odorata</i>	0.	21.7	5.5	12.2	11.2	5.8	17.7	14.7	11.2	
Premier.....	<i>manetti</i>.....	.9	26.0	3.8	8.5	15.1	4.2	13.2	14.6	13.7
	<i>odorata</i>	1.1	14.0	2.8	13.6	17.8	4.2	18.7	17.8	10.0	
Rosemarie.....	<i>manetti</i>	1.3	30.0	4.1	13.6	17.0	4.1	10.9	10.2	8.8	
	<i>odorata</i>.....	.5	25.8	5.6	10.8	8.4	6.1	17.9	12.2	12.7
Red Columbia.....	<i>manetti</i>.....	.4	23.0	6.4	14.3	7.1	9.9	10.7	21.4	6.8
	<i>odorata</i>.....	.3	26.1	9.0	10.9	7.0	9.0	13.6	18.3	5.8
White Ophelia.....	<i>manetti</i>.....	.3	35.1	2.6	12.6	4.6	13.0	8.0	14.3	9.5
	<i>odorata</i>	0.	36.2	4.4	6.8	11.5	7.8	9.8	14.7	8.8	

The results secured with Columbia roses were in general upheld by the results of the test with the other varieties (Table 5). In the latter experiment, however, the numbers of plants on a given stock in the different varieties were in several cases comparatively small, and it would be unwise to place too much reliance on the figures showing apparent differences in flower production in these varieties. No consistent differences in flower production during the winter months were noted with the different varieties on the two stocks (Table 6).

Data obtained from a number of plants of Souvenir de Claudius Pernet were not included in Table 5. Four plants of this variety

grafted on *Rosa manetti* made very poor vegetative growth. Forty-four plants grafted on *Rosa odorata* grew well and flowered freely. The yields per plant were 7.75 ± 2.08 flowers and $11.36 \pm .30$ flowers, respectively. The corresponding averages for stem length were $13.07 \pm .40$ inches and $14.48 \pm .11$ inches.

Rosa odorata plants showed uniformly firm unions at the grafts, and vegetative growth was normal with all varieties tried. Suckering was no more in evidence with *R. odorata* than with plants on *R. manetti*.

CONCLUSIONS AND RECOMMENDATIONS

This experiment has shown that *Rosa odorata* may be used as successfully as *Rosa manetti* as a grafting stock for forcing roses. On the plants grown the graft union was all that could be desired. Under greenhouse conditions suckering was not pronounced. The number of flowers produced on *Rosa odorata* was as large or larger than on *Rosa manetti*, and the quality was equally good in each case.

As a grafting stock for roses under glass *Rosa odorata* is recommended as worthy of wider trial. The most efficient method of using this stock on a commercial scale has not been determined, but four possible methods are available: (1) the canes may be budded and, after the buds have united, may be made into cuttings and rooted. (2) The canes may be made into cuttings and the cuttings used immediately as stocks for grafting, the scions uniting as the cuttings form roots. (3) Plants may be grown from cuttings and used for grafting, as is done at present with *Rosa manetti*. (4) The stocks may be budded as for garden roses in the late summer, lifted as soon as dormant, and then started under glass.

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